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COMPARATIVE EFFICACY OF SOME MODERN ANTHELMINTICS AND PINEAPPLE LEAVES WITH THEIR EFFECTS ON CERTAIN BLOOD PARAMETERS AND BODY WEIGHT GAIN IN CALVES INFECTED WITH ASCARID PARASITES

S. A. Islam[1], M. M. Rahman[2], M. A. Hossain[2], M. G. A. Chowdhury[1] and M. Mostafa

Department of Pharmacology, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh.

ABSTRACT

A twenty five calves of naturally infected with ascarid parasites were treated with different modern anthelmintics and pineapple leaves to study the comparative efficacy during the period from January to September 1997. The calves were divided into five groups. Groups A, B, C, D were treated with ivermectin (200 µg / kg SC), albendazole (7.5 mg / kg orally), piperazine citrate (200 mg / kg orally) and pineapple leaves extract (1 g / kg orally) respectively and group E was kept as untreated control. On the basis of faecal egg count of ascaris in calves, ivermectin was found to be more effective (100%), followed by piperazine citrate (100% at 28th day of post-treatment), albendazole (92.95% at 28th day of post-treatment) and pineapple leaves extract (51.21% at 7th day). Total erythrocyte count (TEC), haemoglobin (Hb) and packed cell volume (PCV) values significantly ($p < 0.05$) increased while erythrocyte sedimentation rate (ESR) significantly ($p < 0.05$) decreased following treatment. Body weights of treated calves were significantly ($p < 0.05$) increased in treated calves than the control. Therefore, ivermectin, albendazole and piperazine citate could be used against ascariasis in calves. Although efficacy of pineapple leaves was not encouraging but it may be used as a substitute for other anthelmintics.

Key words: Comparative efficacy, anthelmintics, pineapple leaves, haematological parameters, body weight

INTRODUCTION

Livestock is one of the most important sectors in agriculture that play an important role to promote humans' health and national economy in Bangladesh. In Bangladesh, parasitism is the major cause hindering the development of livestock population. The climate of Bangladesh is conductive for parasites that are to great extent responsible for calf mortality. In developed countries the principles of control of gastro-intestinal parasites are mainly based on pasture and barn management and protective treatment. In Bangladesh, however, there is no organized pasture and the farmer, graze mixed animals in limited fields. So, the parasitic infection should control by using a routine prophylactic anthelmintic treatment. Some pharmaceutical industries in China, India, Thailand and other countries in the world now a days manufacture a variety of medicinal preparations from indigenous herbs and plants. The World Health Organization (WHO) has recognized the necessity for investigating and mobilizing the ancient medicinal plants that were used to treat in livestock. A very few research has been carried out in Bangladesh on the efficacy of pineapple leaves against ascariasis in calves. The present study was undertaken to evaluate the comparative efficacy of pineapple leaves with some other modern anthelmintics and its effects on certain haematological parameters and live body weight gain in calves.

MATERIALS AND METHODS

The experiment was performed in the Upazila Veterinary Hospital, Katiadi under Kishoregonj district during the period from January to September 1997. A total of 25 calves heavily infected with ascarid parasites were randomly selected from the surrounding villages to study the comparative efficacy of some modern anthelmintics and the pineapple leaves against ascarid (*Toxocara vitulorum*) parasite and their effects on body weight as well as certain haematological parameters. These calves were under 18 months old of both sexes and were selected on the basis of clinical signs and faecal examination. The calves were divided into 5 groups (A, B, C, D and E) and each group consisting of 5 calves. Each calf of group A, B, C, D was treated with ivermectin (Ivomec®, MSD @ 200 µg / kg body weight subcutaneously), albendazole (Aldazole®, Techno Drugs, Bangladesh @ 7.5 mg / kg body weight orally), piperazine citrate (Avipar®, Rhone-Poulenc @ 200 mg / kg body weight orally) and pineapple (*Ananus sativus*) leaves (1 g / kg body weight orally) respectively. Calves of group E were kept as untreated control.

Present address: [1]Veterinary Surgeon, Directorate of Livestock Services, Bangladesh, [2]Department of Pathology and Parasitology, Chittagong Government Veterinary College, Pahartali, Chittagong-4202, Bangladesh.

The anthelmintic efficacy results were evaluated on the basis of reduction of faecal egg count. Faecal samples were collected from all the 25 ascarid infected calves at pre- and post-treatment (7th, 14th, 21st and 28th days of post-treatment) with different anthelmintics and pineapple leaves. These samples were examined for counting of ascarid eggs per gram (epg) of faeces by modified Stolls' dilution technique as described by Soulsby (1986). The parasitic eggs were identified on the basis of characteristic morphological features as described by Soulsby (1986) and then counted. Three slides were examined for each sample and the mean of eggs was multiplied by 100 and was considered as egg per gram (epg) of faeces.

The body weight of all the experimental groups of calves were measured at pre-treatment and 60th day on post-treatment. The body weight was measured by using the formula described by Samad (1996).

$$\text{Body weight} = \frac{\text{Length x (Girth)}^2}{300} = \text{Pound (lb); (2.2 lb = 1 kg)}$$

Haematological examinations were carried out in all the groups of calves. About 0.5 ml of venous blood was collected from jugular vein in vial containing EDTA as anticoagulant from each of the experimental calves at pre-treatment and on day 28th post-treatment. The collected blood samples were brought to the laboratory and the haematological parameters (TEC, Hb content, PCV and ESR) were determined as per method described by Coffin (1955) and Jain (1986). The results were analyzed statistically between treated and control groups by using analysis of variance (Gupta, 1982)

RESULTS AND DISCUSSION

Efficacy of modern anthelmintics and pineapple leaves

Ascarid infected calves of group A with average egg count of 1880 ± 83.66 epg (pre-treatment value) were used for trial with ivermectin (Ivomec®, MSD) at the dose rate of 200μg / kg body weight subcutaneously. The 100% reduction of egg count was recorded at the 7th day of post-treatment and this 100% reduction of egg count was found throughout the study period especially on the 14th, 21st, and 28th days of post-treatment (Table 1). This result is in conformity with the earlier reports of Wagmare *et al.* (1991) and Labarthe *et al.* (1996) who found 100% reduction of epg of ascariasis with ivermectin treatment.

Table 1. Comparative efficacy of different modern anthelmintics and pineapple leaves against ascariasis in calves

Groups (n = 5)	Drugs with dose per kg body weight	Egg per gram (epg) of faeces (Mean ± SD)				
		Pre-treatment	Post-treatment			
			7th day	14th day	21st day	28th day
A	Ivomec® @ 200 μg	1880 ± 84	0 (100)	0 (100)	0 (100)	0 (100)
B	Aldazole® @ 7.5 mg	1760 ± 114	580 ± 148 (67.04)	440 ± 114 (75)	400 ± 75 (77.28)	300 ± 100 (92.95)
C	Avipar @ 200 mg	1560 ± 151	300 ± 71 (80.76)	200 ± 89 (83.33)	180 ± 84 (88.46)	0 (100)
D	Pineapple Leaves @ 1 g	1640 ± 167	800 ± 158 (51.21)	900 ± 100 (45.22)	980 ± 84 (40.24)	1100 ± 158 (32.92)
E	Control	1780 ± 130	1820 ± 84	1860 ± 114	2000 ± 158	2040 ± 152

n = No. of calves per group, ( ) = % reduction of egg per gram (epg) of faeces.

The ascarid infected calves of group B with an average egg count of 1760 ± 114 epg (pre-treatment value) were used for anthelmintic trial with albendazole (Aldazole®, Techno Drugs Ltd., Bangladesh) at a dose rate of 7.5 mg / kg body weight orally. The percentage reduction of epg count was found to be 67.04, 75, 77.28 and 92.95 on day 7th, 14th, 21st and 28th days of post-treatment respectively (Table 1). The maximum efficacy of Aldazole® was found to be 92.95% against ascariasis in calves on the 28th day of post-treatment. This result supports the earlier reports of Guha *et al.* (1986), and Yadav and Kumar (1990) who found about 100% efficacy with albendazole against ascariasis in calves.

The calves of group C with an average egg count of 1560 ± 151 epg (pre-treatment value) were used for anthelmintic trial with piperazine citrate (Avipar®, Rhone Poulenc) at the dose rate of 200 mg / kg body weight orally. The percentage reduction of epg was found to be 80.76%, 83.33%, 88.46% and 100% on 7th, 14th, 21st, and 28th days of post-treatment respectively (Table 1). The 100% reduction of epg with Avipar® (piperazine citrate) was recorded against recorded against ascariasis in calves on the 28th day of post-treatment. This result supports the earlier reports of Sukhaparna (1983). The ascarid infected calves of group D with an average egg count of 1640 ± 167 epg (pre-treatment value) were used to determine the comparative efficacy of pineapple leaves at a dose rate of 1 g / kg body weight orally. The percentage of reduction of epg count was found to be 51.21%, 45.22%, 40.24%, and 32.92% on 7th, 14th, 21st and 28th days of post-treatment (Table 1). The maximum of 51.21% reduction of epg as found with pineapple @ 1 g / kg body weight orally on the 7th day of post-treatment and the reduction of epg was decline to 32.92% on the 28th day of post-treatment. The anthelmintic activity of pineapple leaves has been provided by Chopra *et al.* (1956).

Haematological parameters

The total erythrocyte count (TEC), haemoglobin (Hb), packed cell volume (PCV) and erythrocyte sedimentation rate (ESR) were examined in each calf of all five experimental groups treated with different anthelmintics at pre-treatment and 28th day of post-treatment. The percentage of mean values changed was analyzed.

The percentage of mean TEC in calves of group A (Ivomec® treated), B (Aldazole® treated), C (Avipar® treated), D (pineapple treated) at 28th day of post treatment were increased significantly ($p < 0.05$) to their respective pre-treatment values. The higher difference between pre-treatment and post-treatment values of TEC was recorded in groups of calves treated with ivermectin (26.71%) and piperazine citrate (26.4%) than treated with albendazole (11.77%) and pineapple leaves (9.06%). But the mean change of percentage of TEC in control group of calves was decreased (4.85%), (Table 2). These findings partially support the earlier reports of Welson (1969).

Table 2. Haematological changes in calves treated with modern anthelmintics and pineapple leaves against ascariasis

Groups (n = 5)	Drugs with dose per kg body weight	Change of different certain blood parameters (Mean ± SD)			
		TEC (10^6 / mm^3) (%)	Hb (g%) (%)	PCV (%) (%)	ESR (mm / hr) (%)
A	Ivomec® @ 200 μg	+ 26.71*	+ 21.05*	+ 3.56*	– 2.95
B	Aldazole® @ 7.5 mg	+ 11.77	+ 13.15	+ 2.4	– 2.68
C	Avipar® @ 200 mg	+ 26.4*	+ 16.08*	+ 4.78*	– 2.92
D	Pineapple leaves @ 1 g	+ 9.06	+ 1.74	+ 2.14	– 1.76*
E	Control	– 4.85	– 3.28	– 1.84	+ 45.9

n = No. of calves per group, *Differed significantly at $p < 0.05$.

The mean percentage of Hb values on 28th days of post-treatment in all groups of ascariasis affected calves treated with different anthelmintics increased significantly ($p < 0.05$) in comparison to their respective pre-treatment values. The higher difference (% change) between pre-treatment and post-treatment Hb values was recorded in groups of calves treated with ivermectin (21.05%) and piperazine citrate (16.08%) than treated with albendazole (13.15%) and pineapple leaves (1.74%). But the change percentage of mean Hb value in control group of calves was decreased (3.28%) (Table 2). These findings partially support the earlier reports of Welson (1969).

The mean percentage of PCV on 28th day of post-treatment in all groups of ascariasis affected calves treated with different anthelmintics increased significantly ($p < 0.05$) with comparison to their respective pre-treatment values. The higher difference (% change) between pre- and post-treatment PCV values were recorded in groups of calves treated

with piperazine citrate (4.78%) and ivermectin (3.56%) than treated with albendazole (2.4%) and pineapple leaves (2.14%). But the change of Hb value in control groups of calves decreased (1.84%) (Table 2). These findings partially support the earlier reports of Welson (1969). The mean ESR on 28th day of post-treatment in all the groups of ascariasis affected calves treated with different anthelmintics decreased in comparison to their respective pre-treatment values except control. The higher rate of decrease (% change) between pre- and post-treatment ESR values were recorded in the groups of calves treated with ivermectin (2.95%) and piperazine citrate (2.92%) than the albendazole (2.68%) and pineapple leaves (1.76%). The haematological values especially TEC, Hb and PCV of ascarid affected control groups of calves decreased whereas the ESR values increased. These haematological values (TEC, Hb and PCV) of ascariasis affected calves returned to normal level and even slightly increased after anthelmintic treatment.

Effect of anthelmintics on body weight gain in calves

The mean body weight (kg) on 60th day of post-treatment in all the groups of calves with ascariasis treated with different anthelmintics with their control increased significantly ($p < 0.05$) in comparison to their respective pre-treatment values. This indicates that body weight of calves increased with the increase of age. However the higher difference (% change) between the pre- and post-treatment body weight gain were recorded in groups of calves treated with anthelmintics like ivermectin (10.36%), albendazole (14.76%), piperazine citrate (15.25%) and pineapple leaves (23.0%) in comparison to control (8.26%) group (Table 3).

Table 3. Effects of some modern anthelmintics and pineapple leaves on body weight gain in calves with ascariasis

Groups (n = 5)	Drugs with dose per kg body weight	Body weight (kg) gain (Mean ± SD)			
		Pre-treatment	Post-treatment (60th day)	Change	% Change
A	Ivomec® @ 200 μg	60.8 ± 4.02	67.1 ± 2.3	+ 6.3	+ 10.36
B	Aldazole® @ 7.5 mg	29.8 ± 4.14	34.2 ± 3.43	+ 4.5	+ 14.76*
C	Avipar® @ 200 mg	39.2 ± 2.58	45.1 ± 2.12	+ 5.9	+ 15.25*
D	Pineapple leaves @ 1 g	18.2 ± 4.49	22.4 ± 2.4	+ 4.2	+ 23.0*
E	Control	24.2 ± 2.86	26.2 ± 2.86	+ 2.0	+ 8.26

n = No. of calves per group, *Differed significantly at $p < 0.05$.

Although the live body weight gain was recorded in both the anthelmintics treated and untreated control ascarid infected calves but significant ($p < 0.05$) increase was found in groups of anthelmintics treated calves. These results support the earlier reports of Bells *et al.* (1988).

It is therefore, concluded that ivermectin, albendazole and piperazine citrate effective against ascariasis in calves. Although efficacy of pineapple leaves is not encouraging, is useful in improving health condition and haematological parameters in calves and may be used for the substitute of other anthelmintics.

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